

Geotechnical Laboratory PO Box 4339 1570 Bear Creek Road Oak Ridge TN 37830 (865) 482-6497

CERTIFICATE OF ANALYSIS

Stephen Trent Fluor Hanford, Inc. 825 Jadwin Avenue Richland, Washington 99352 January 4, 2005

This is the Certificate of Analysis for the following samples:

Shaw Project ID: Shaw Project Number: Client Sample Data Group: Date Received by Lab: Number of Samples: Sample Type: Eberline - Hanford 100846.34000000 H2817 November 17, 2004 One (1) Soil



I. <u>Introduction/Case Narrative</u>

One soil sample was received by the Shaw Geotechnical Laboratory on November 17, 2004. The sample was submitted for determination of moisture content, bulk density, and sieve analysis, permeability, specific gravity and calcium carbonate content. The sample number received was B19NK4.

Please see Appendix A, Sample Number Cross Reference List; Appendix B, Analysis Results; and Appendix C, Chain-of-Custody/Sample Receipt Records.

"I certify that this data package is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature."

Reviewed and Approved:

Ralph Cole

Laboratory Manager, Geotechnical Services

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Fluor Hanford, Inc.
Shaw Project Name: Eberline Hanford
Shaw Project No. 100846.34000000
SDG No. H2817

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II. Analytical Results/Methodology

REFERENCES: United States Army Corps of Engineers (USACE), Engineer Manual 1110-2-1906, Laboratory Soils Testing, appendix II, 1970; United States Environmental Protection Agency, SW846, Test Methods for Examining Solid Waste, Physical/Chemical Methods, 3rd ed., Nov 1986 (EPA SW-846). Annual Book of ASTM Standards, Section 4, Construction, Volume 04.08, Soil and Rock (I), and Volume 04.09, Soil and Rock (II), 2004. Shaw Environmental and infrastructure, Standard Operating Procedures.

Moisture Content of Soil and Rock	ASTM D 2216
Bulk Density of Soils	EM 1110-2-1906
Particle-size Analysis of Soils	
Specific Gravity of Soil	
Calcium Carbonate Content	

III. Quality Control

Quality control checks such as duplicates and spikes (QC samples), are not normally applicable to geotechnical testing. This is due largely to the inability of obtaining samples with known characteristics, the heterogenous nature of the samples, and quality control procedures built-in to the analytical method.

QC measures to ensure accuracy and precision of test results include the following:

- 100% verification of all numerical results raw data entries, transcriptions and calculations entered by lab technicians are checked, recalculated and verified. Most data calculations are performed by computer programs.
- Data validation through test reasonableness summaries of all test results for individual reports are reviewed to determine the overall reasonableness of data and to determine the presence of any data that may be considered outliers.
- Quality control procedures are built into most standardized geotechnical procedures. For example, liquid limit and plastic limit analyses call for re-analyses and specify acceptance criteria.
- Routine instrument calibration instruments, gauges and equipment used in testing are calibrated on a routine basis. All instrument calibration follows ASTM or manufacturer quidelines.
- Maintenance of all past calibration records calibration records and certification documents of all instruments, gauges and equipment are updated routinely and maintained in the Quality Control Coordinators Quality/Operations files.

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- Certified and trained personnel all technicians are certified by the National Institute for Certification of Engineering Technicians (NICET) in geotechnical soil testing, and are trained in the application of standard laboratory procedures for geotechnical analyses as well as the quality assurance measures implemented by Shaw.
- Quantitative analyses frequently used in geotechnical/physical testing programs do not use
 QC tools common to wet chemistry or radiochemistry laboratories. Measures not employed
 in the analysis of samples reported in this report include: laboratory control samples (LCS),
 blanks, matrix spikes (MS), duplicate analyses, dilutions, digestions, correction factors,
 surrogate sample analyses, detection limit determinations, control charts, and/or tentatively
 identified compounds (TICs).

IV. Data Qualification

This soil sample contained a significant amount of oversize particles. Therefore, in addition to the normal specific gravity test (ASTM D 854) the specific gravity of the coarse fraction was determined by ASTM C 127. The value representing the overall sample specific gravity is given as "average bulk specific gravity". Other values are given that relate to materials used in civil engineering fields.

Appendix A
Sample Cross-Reference List

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SAMPLE NUMBER CROSS-REFERENCE LIST

LAB SAMPLE NO.	CLIENT SAMPLE NO.	MATRIX
BC0472	B19NK4	Soil

Appendix B Sample Test Results Page 5 of 14
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MOISTURE CONTENT

PROJECT NAME

Eberline - Hanford

PROJECT NUMBER

100846.34000000

LAB SAMPLE NO.	CLIENT SAMPLE NO.	MOISTURE, % ASTM D 2216	MOISTURE, % SW846	SOLIDS, % SW846
BC0472	B19NK4	18.2	15.4	84.6
		<u> </u>		

ASTM D 2216 results are based on dry sample weight.

SW846 results are based on wet sample weight.

Solids content is determined by subtracting the SW846 moisture (%) from 100.

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BULK DENSITY/DRY DENSITY EM-1110-2-1906, APPENDIX II

PROJECT NAME:

PROJECT NUMBER:

Eberline - Hanford

100846.34000000

LAB SAMPLE NUMBER	CLIENT SAMPLE NUMBER	AVERAGE LENGTH, inches	AVERAGE DIAMETER, inches	WET WEIGHT, grams	MOISTURE CONTENT, %	BULK DENSITY, pcf	DRY DENSITY, pcf
BC0472	B19NK4	5.9740	3.9112	2311.71	17.3	122.7	104.6
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Moisture content calculated by ASTM D 2216 based on sample dry weight.

Bulk density is the weight of wet sample divided by the volume of the wet sample (as-received).

Dry density is the weight of the dry sample solids divided by the volume of the original sample.

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PARTICLE-SIZE DISTRIBUTION ASTM D 422

Project Name Eberline Hanford

Field Sample No. B19NK4

Project No.

100846.34000000

Lab Sample No.

BC0472

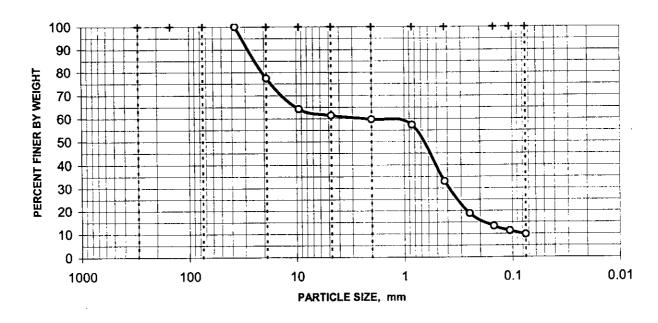
Moisture Content = 17.3% based on dry sample weight

SIEVE ANALYSIS

	Sieve	Diameter	Percent
	No.	mm	Finer
CO	3"	75.000	100.0%
Ā	1.5"	37.500	100.0%
R	0.75"	19.000	77.4%
S	0.375"	9.500	64.2%
-	#4	4.750	61.4%
<u> </u>	#10	2.000	59.7%

	Sieve	Diameter	Percent
	No.	mm	Finer
F	#20	0.850	57.3%
i	#40	0.425	33.0%
N	#60	0.250	18.8%
E	#100	0.149	13.3%
	#140	0.106	11.3%
	#200	0.075	9.7%

DISTRIBUTION CURVE



38.6% Gravel

51.6% Sand

9.7% Silt/Clay

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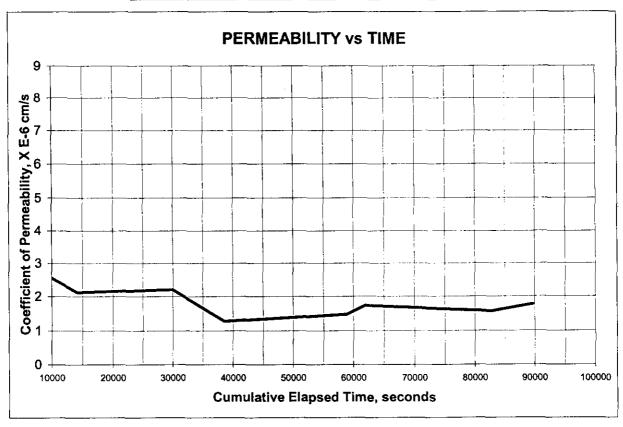
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HYDRAULIC CONDUCTIVITY / PERMEABILITY ASTM D 5084

PROJECT NAME: Eberline Hanford CLIENT SAMPLE NO. B19NK4
PROJECT NO. 100846.34000000 LAB SAMPLE NO. BC0472

	INITIAL FINAL		
Specimen diameter, cm	6.24		
Specimen length, cm	5.69	Hydraulic gradient	6.2
Wet weight of specimen, g.	377.65	Min. consolidation stress, p	osi 12.0
Specimen cross-sect, area, cm/	^2 30.56	Max. consolidation stress,	psi 12.0
Water content, %	17.3	Total backpressure, psi	0.0
Wet unit weight, pcf	135.6		
Dry unit weight, pcf	115.6	Permeant Fluid D	Deaired DI Water
Degree of saturation, %	107.2		
Specific gravity of solids	2.64		

Coefficient of Permeability, cm/s 1.6E-06



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SPECIFIC GRAVITY ASTM C 127 ASTM D 854

PROJECT NAME:

Eberline Hanford

PROJECT NUMBER:

100846.34

LAB	CLIENT	SPEC.	BULK	AVERAGE	APPARENT	AVERAGE	BULK SPEC.	
SAMPLE	SAMPLE	GRAV.	SPEC.	BULK SPEC.	SPECIFIC	APPARENT	GRAVITY	ABSORPTION
NUMBER	NUMBER	<4.75mm	GRAVITY	GRAVITY	GRAVITY	SPEC. GRAV.	SSD*	%
BC0472	B19NK4	2.7399	2.5133	2.6422	2.6055	2.6831	2.5487	1.41
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^{*} Saturated Surface Dry

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Carbonate Content of Soils ASTM D 4373

PROJECT NAME:

Eberline Hanford

PROJECT NUMBER:

100846.34000000

LAB SAMPLE NO.	CLIENT SAMPLE NO.	C O3, %
BC0472	B19NK4	0

Appendix C Chain-of-Custody and Request-for-Analysis Records

	F	LUOR	Hanford Inc.	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST						FO	F03-018-158 PAGE 1			OF 1	
COLLECTOR				CONTACT TELEPHONE NO. PROJECT COORDINATOR				OR PI	CICE CODE	8N		DATA			
Pope/Pflster/Wiberg/Tyra				Steve Trent 373-5869 TRENT, S)										NAROUND	
SAMPLING L	OCATIO	ON		PROJECT DESIG	NATION				SAF NO.	,	IA A	R QUALITY	Ш		Days / 5 Days
216-Z-9/C34	26 - Inte	rval 36	7FT - 369.5FT	216-Z-9 Trench Characterization Borehole - Soil F03-018									-		
ICE CHEST N	Pil (2 n	FIELD LOGBOOK NO. COA METHOD OF SHIPMENT HNF-N-360 1 119325ES10 Federal Express												
<i>L</i>	7/1/	<u>- U</u>	7-004	HNF-N-360 1			119325ES10						1 - 4		
SHIPPED TO)			OFFSITE PROPS	RTY NO.	1 14	U21.		BILL OF	LADING/AIR I	רועיי	UU	YQL,	,	
Shaw Group					<u>u </u>	None	None	1		- / U	 	- (<u></u> .	
MATRIX* A=Air DL=Dnum	POS RADIO	SIBLE ACTIVE	SAMPLE HAZARDS/ REMARKS TIE TO: B19932 (160 1) [] 0	PRESER	VATION							ļ	-	<u> </u>	17.17.17
Liquids DS≖Drum Solids			BIACKL	TYPE OF C	ONTAINER	Moisture Resistant Con	Liner								
L=Liquid O=Oil S=Soll				NO. OF CON	ITAINER(S)	1	2								
SE=Sediment T=Tissue V=Vegitation W=Water				VOL	UME	200g	1000g								
WI=Wipe X=Other	SPE	CIAL I	HANDLING AND/OR STORAGE	SAMPLE A	 INALYSIS	Moisture Content - D2216	SEE ITEM (1) IN SPECIAL INSTRUCTIONS								
SAMP	LE NO.		MATRIX*	SAMPLE DATE	SAMPLE TIME	\$			- I ——				1		
B19NK4			SOIL	11/10/04	1745	X	X		BC	0472	********				
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FINAL SAM		DISPOSED BY										DATE/TIME			

30G4 H2817

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Eberline Srvces

CHAIN OF CUSTODY

ORD # R4-11-123

RCVD: 11/12/04 DUE: 12/27/04

11/15/04 08:30:04

WORK ID: SAF# F03-018 SDG H2817 KEEP: 12/27/05 DISP: S

DASH SAMPLE IDENTIFICATION	STORED	TESTS			
01A-S B19NK4	SHAW	DISPOS	E331S E333S	E335\$ E342\$	
39222222222222222222222222222222222222	:==========		=======================================		==========
RELEASED BY	DATE	TRANSFERRED TO	<u>DATB</u>	RECEIVED BY	DATE
1. Dane	166/04	Show	11/16/24	God Colum	11.17.04